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Auto-Hypnosis: Defining the Phenomenon

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INTRODUCTION

In current language, the term auto-hypnosis[1] [Barabasz & Barabasz, 2015] refers to a transition from normal consciousness to the physiological modification of consciousness called hypnosis [Casiglia, 2025; Casiglia & Gadotti, 2022]. Arreed Barabasz recalls that Mullin (in 1958) and Gill & Brenman (in 1959) were the first to hypothesize and describe the phenomenon [Barabasz, 2005], without however being able to demonstrate it[2]. Today, according to all hypnotists and almost all psychotherapists[3], auto-hypnosis is hypnosis without induction, which in many cases (certainly in highs, as experimentally demonstrated) is not necessary even in a structured setting [Callara et al., 2023]. The experiences lived during hypnosis and auto-hypnosis are likely driven by response expectancies, hypnotizability, and baseline experiences [Cardeña & Terhune, 2019].

This paper examines, within not only an experimental but also an anthropological framework, studies that have attempted to explain this phenomenon, attempting to interpret the results with the findings of experimental studies on hypnosis. It also proposes a possible explanation for the phenomenon based on experimental evidence demonstrating the effect of hypnosis on receptor systems.

According to an anthropological perspective, auto-hypnosis has its roots in the ancient origins of Homo sapiens. There was a time when Homo sapiens did not possess an ego, yet they lived without problems, instinctively adapting to the world – eating, reproducing, avoiding danger, and so on – just like the pre-human African primates to whose lineage they belonged [Casiglia, 2020, 2025; Casiglia & Gadotti, 2026b, 2026a, 2026b]. Subsequently, a self-generating Unconscious [4] developed, which obviously went unperceived[5]. Even later (perhaps around 15,000-12,000 years ago) this Unconscious began to organize itself into *disembodied endo-cerebral voices of right cortical origin* which however were perceived as external and not criticized given the absence of an Ego [Jaynes,

1 auto-hypnosis refers to a hypnotic trance that arises spontaneously without being attempted, and self-hypnosis refers to a trance that a subject can deliberately achieve on their own without the intervention of a hypnotist; in the present paper we will only discuss auto-hypnosis

2 this did not have much importance at the beginning because hypnosis was the prerogative of psychologists who are used to dealing with descriptive rather than scientific arguments and are not used to requiring that they be demonstrated; for us scientists it is different

3 those, obviously, who accept hypnosis as part of their cultural background, which are not the totality

4 the ontological existence of the Unconscious in modern *sapiens*, hypothesized by psychoanalysts, was experimentally demonstrated for the first time in 2016 at the University of Padua [Casiglia et al., 2016a].

5 even today the Unconscious itself is not perceived, even if our Ego allows us to see certain effects such as dreams, slips of the tongue, neuroses etc.; but at that time there was no Ego capable of contemplation, and the Unconscious acted undisturbed, without principles and without morality

1976]: they told *sapiens* how to act and what to do in different circumstances through a system almost similar to the type of non-conscious neurological command *(hear→obey*) as long as he was within his own social community or at least near totemic recall systems [Casiglia, 2008, 2020, 2022a; Kuijsten, 2006; Jaynes, 1976]. Although apparently bizarre, this system of so-called *bicameral voices*, which were generally those of parents, leaders, kings and eminent figures (even – indeed, often – deceased) or of externalized gods**6**, proved to be very efficient, functioned very well for tens of thousands of years and allowed *sapiens* to adapt to adversity, to survive and to proliferate by overcoming the numerous bottlenecks that at certain moments in evolution brought the individuals of the *sapiens* species**7** to a few thousand or even hundreds of specimens [Casiglia, 2020; Guyon et al., 2024; Karmin et al., 2018; Zeng et al., 2019]. It is therefore not surprising that even today internal voices *(inner speech)* carry out such an important individual and social task [Casiglia & Gadotti, 2026a].

Bicameral voices – which first appeared in the Fertile Crescent of what is now the Middle East – were initially and for a long time symbolic, non-verbal. Gradually (but we are still in prehistory), the glottis lowered[8] (~35,000 BC), providing *Homo sapiens* with the hardware to articulate phonemes. Then (~28,000 BC), Broca's area, responsible for this articulation, developed in the left hemisphere of the brain[9], and ~3,000 years later, Wernicke's area, responsible for understanding language. The discovery of *written language*, at the thermal maximum of the Holocene, at the beginning of the Bronze Age, marked the end of prehistory and the beginning of history, but *Homo sapiens* remained unconscious [Casiglia, 2020; Jaynes, 1976].

Then, very recently, in the historical era, say between 1,500 and 1,200 BC[10], the bicameral voices abruptly began to fall silent [Jaynes, 1976; Neumann, 1949], which undoubtedly led to the death or marginalization of the unconscious bicameral humans, who no longer had an internal guide on which to rely. Only in the few humans who, through mutation[11], had developed a suitable *internal analog space* [Jaynes, 1976] and were now fit

6 this is known from the analysis of the most ancient myths and from the analysis of the first inscriptions found which cited the myths themselves

7 che ancora non sapevano parlare avendo una glottide troppo alta e mancando delle aree cerebrali dell'articolazione del linguaggio che poi avremmo chiamato *area di Broca*, e comunque non avrebbero capito le parole udite dall'esterno essendo privi dei centri cerebrali che poi avremmo chiamato *area di Wernicke*

8 a modification that *sapiens* paid and still pays with the risk of aspirating food, that is, of running into *pneumonia ab ingestis* or immediate suffocation, so much so that there are modern techniques to remedy it such as cricothyrotomy [Casiglia & Mazza, 2013]; the species-specific evolutionary advantage of language, therefore, must have been enormous if this dangerous modification has reached us by overcoming Darwinian natural selection [Casiglia, 2020]; whoever wants to hear what phonemes a human could produce before the lowering of the glottis can see the BBC movie on the site https://www.youtube.com/watch?v=o589CAu73UM

9 this is for right-handed people; for left-handed people, already present although in the minority among our ancestors [Dominguez-Ballesteros & Arrizabalaga, 2015], the situation was (presumably) symmetrically inverted

10 perhaps around 1.250 BC, at the time of the volcanic explosion of the island of Thera, now Santorini

11 Among the most relevant mutations for us we recall the PCDHX and PCDHY duplication of the gene encoding protocaredin (involved in the asymmetry of the hemispheres, manual ability and language), the deletion Neu5Gc in the CMAH gene (loss of fur and reduction of muscular strength in the genus Homo 2.5 million years ago, after the separation from the genus Pan), the variation of the FOXP2 gene (occurred in the species Homo sapiens 300,000 years ago and implicated in the origin of language) and the inactivation of the MYH16 gene which in apes codes for a strong masticatory musculature (the weaker musculature of Homo sapiens has reduced the bone crests allowing the enlargement of the skull to contain a larger brain) [Biondi &

to overcome the catastrophic event of the death of the voices, only in them did the voices themselves organize themselves, creating a new function, a separate part of the mind, a complex [Jung, 2023] that today we call the Ego or I, a complex formed by the voices that from the right hemisphere – now no longer dominant but acquiescent – metaphorically moved into the linguistic centers of the left hemisphere. The Ego was a particularly successful complex above all because it inserted into *sapiens* the fear of death, which is certainly useful for the survival of the species[12]. All of us modern representatives of the species *Homo sapiens* derive from these conscious survivors and have inherited from them an inconstant and fragile Ego that is a mere metaphor [Jaynes, 1976; Kuijsten, 2006; Casiglia, 2020; Jung, 2023; Nueman, 1949], little more than a dream[13] that must be culturally transmitted to continue to exist[14], depends on internal voices [Casiglia & Gadotti, 2026, 2026a], feeds on semantics [Jaynes, 1976], responds well to words and continually renews itself by virtue of a symbolic thought that has been relegated to the Unconscious [Craparo & Mucci, 2016] where it mostly produces dreams, neuroses, creativity and psychopathology of everyday life[15].

HOMO SAPIENS = HOMO CRĒDŬLUS AND HYPNOSIS AS HIS/HER CHARACTERISTIC

Homo sapiens has the particular characteristic of being *crēdŭlus (gullible)*. If it were not, the ego would not have formed, and today we would be unconscious like our ancestors [Casiglia, 2020].

It is assumed that the *Homo sapiens species* developed around 200,000–65,000 BC in Africa, presumably in the Rift Valley of present-day Tanzania, and early on developed innovative characteristics, such as a large skull, especially in the frontal and parietal regions. However, it was not until 75,000 years ago that *sapiens* underwent a cognitive boost that made their brains plastic, adaptable, and ductile. This was beneficial for the evolutionary aspects of the species, but, in addition to endowing us with abstraction and creativity, it also made us particularly gullible, impressionable, suggestible, and prone to accepting the opinions of others [Pievani, 2019]. These are problems that plagued us until after the Middle Ages but which we still carry with us; generally speaking, it is easier to deceive a *sapiens* than an animal, which is at least more suspicious. Gullibility is the price we pay for the privilege of being creative.

Richards, 2023; Casiglia & Gadotti, 2026, 2016a, 1026b]. All acronyms used in this note and in the rest of the paper are listed in Table 1.

12 the Ego serves only two purposes: 1) to instill the fear of death and 2) to allow sapiens to enjoy the world, thus preventing suicide (subjects with anti-conservative tendencies certainly became extinct in the early times, remaining today only in a few cases defined as pathological); the Ego has no other functions, it does not make sapiens better, nor more skilled, nor more capable of deciding because the Unconscious takes care of all this [Casiglia, 2020, 2022a; Casiglia & Gadotti, 2026]

13 read the beautiful booklet *L'Incertitude Qui Vient dès Rêves* [Caillois, 1956]

14 obviously, experiments of this kind cannot be done but there are quasi-experimental examples of children lost alone in remote places who have never developed an Ego (at least 10 well-documented cases are known) [Casiglia, 2020, 2020a]

15 where it mostly produces dreams, neuroses, creativity and psychopathology of everyday life and where it manages conflicts that cannot be consciously resolved [Freud, 1900; Jung, 2023; Strachey, 1968]; but the Ego is also a product of the Unconscious [Casiglia, 2020; Casiglia, 2025; Casiglia & Gadotti, 2026, 2026a, 2026b; Gadotti & Casiglia, 2026]

One of the main consequences of gullibility is the naive psychologies to which we abandon ourselves [Casiglia, 2020; Casiglia & Gadotti, 2026b].

SPONTANEOUS AUTO-HYPNOSIS: A HYPOTHESISED BUT VERY LITTLE STUDIED PHENOMENON

Given these premises, it is not surprising that *Homo sapiens* is so prone to self-deception, especially if the deception stems from internal voices and works to its advantage, as is always the case not only in structured hypnosis induced by others for medical purposes but also in auto-hypnosis.

Outside of a structured setting, hypnosis appears to exist as a spontaneous event (auto-hypnosis) with its own phenomenology, now known but often overlooked. However, spontaneous auto-hypnosis (without an operator and without induction) [Callara et al., 2023] is little studied because it typically occurs spontaneously, outside of any research protocol. Thus, given the scarcity of experimental evidence, widely divergent explanations for the phenomenon have emerged.

AUTHORITATIVE ANECDOTIC EXAMPLES OF AUTO-HYPNOSIS

Aside from the supposed auto-hypnosis of drivers described below, several episodes of overt, non-otherwise induced spontaneous hypnosis have been documented in the literature—though not experimentally proven. Below, we will cite only those described in the literature by physicians and psychologists.

High drivers, particularly those more dissociative, sometimes report having in their daily lives more unusual experiences and modifications of consciousness, such as alterations in body image, sensations, sense of reality, and a disinclination to act [Pekala et al., 1995] that "seems to carry over to the hypnotic context" [Cardeña & Terhune, 2019]. Others experience a sense of compulsion [Pekala & Kumar, 2007], "even when no specific suggestions for these effects have been administered."

The literature also cites an interesting case of spontaneous age regression (i.e., "reliving the past as though it were occurring in the present, with age-appropriate vocabulary, mental content, and affect") in a 16-year-old girl, evidently due to auto-hypnosis [Spiegel & Rosenfeld, 1984]. We are well acquainted with age regression and revivification, having studied it and demonstrated its ontological existence, measurability, and repeatability in a hypnotic setting structured using the methods of Galilean physiology [Giordano et al., 2012].

A famous episode of auto-hypnosis – particularly interesting because it occurred to a physician – is the one described by David Livingstone (1813–1873), that of *"Dr. Livingstone, I Suppose"*. This is a auto-hypnosis that occurred for protective purposes, as a mild and temporary mental dissociation was preferable to a direct confrontation with reality. Livingstone, in 1843, on a trip to Mabotsa in present-day South Africa, discovered a group of lepers driven from their native villages, stayed with them, and set up a field hospital with his own resources [Handerson, 2015]. It was there that Livingstone, tired from the backbreaking work, one evening went beyond the protective fence for a walk in the forest when a lion attacked him, biting his shoulder. Livingstone writes: *"I saw the lion just in the*

act of springing upon me. I was upon a little height; he caught my shoulder as he sprang, and we both came to the ground below together. Growing horribly close to my ear, he shook me as a terrier dog does a rat. The shock produced a stupor similar to that which seems to be felt by a mouse after the first shake of the cat. It caused a sort of dreaminess, in which there was no sense of pain nor feeling of terror, though quite conscious of all that was happening. It was like what patients partially under the influence of chloroform describe, who see all the operation, but feel not the knife". [Livingstone, 1857]. The description is very consistent with auto-hypnosis accompanied by analgesia [Casiglia et al., 2007, 2012, 2015b, 2020, 2015; Facco et al., 2011, 2013]. The ordeal had a happy ending; the lion moved away after the arrival of other people without renewing the attack, and Livingstone was able to return to his hospital, albeit with a torn shoulder and pain for the rest of his life.

Another interesting and authoritative episode of self-hypnotic analgesia with dissociation occurred to psychotherapist Maria Teresa Tosello: *"A pickup truck hit me on its scooter, throwing me to the ground on a busy road, breaking my collarbone and an unspecified number of ribs. Now that the trauma is over, I fully agree with Livingstone's account... It was a shame Livingstone didn't complete his account. Of course, he too must have discovered the explosion of pain when help arrived, as I experienced with extraordinary timing when the door of the emergency room where I had been carried on a stretcher opened and someone in a white coat entered: I was immediately able to point out the injured body part. The analgesia and the absence of fear, keeping me calm, prevented me from worsening the injuries. The power and timeliness of these positive reactions in extreme danger make one think, with gratitude to Mother Nature and relief, of the many victims of violence who perhaps find oblivion in spontaneous trance".* [Tosello, 2015].

Psychotherapist Milton H. Erickson, who spoke of *common everyday trance* [Erickson & Rossi, 1976], also reported having had several episodes of auto-hypnosis, for which reference is made to the appropriate source [Erickson & Rossi, 1977].

ATTEMPTS TO EXPERIMENTALLY DEMONSTRATE AUTO-HYPNOSIS

An elusive model. To date, there appears to be no validated model to explain the onset of auto-hypnosis, as evidenced by the fact that widely conflicting explanations exist. There is also an experimental problem. People, in everyday life, do not live with an EEG helmet, much less inside the tube of fMRI. Until devices are capable of monitoring brain activity in an unrestricted manner, as is done with blood pressure [Zhang et al., 2025], ECG [Kusumoto et al., 2018], and other vital signs, the state of everyday mental activity will remain unknown. In fact, very few experimental models have been proposed to highlight auto-hypnosis.

Sleeping with the eyes open while driving. It is highly unusual for the law to lend a hand to science[16], but sometimes it happens. This is what happened to auto-hypnosis, thanks to

16 usually the two worlds ignore each other, also because the Law does not accept scientific progress until years or decades later [Casiglia, 2022]

or due to road traffic laws. It has been noticed that some, perhaps many, road accidents occur inexplicably, as if the driver, driving a motor vehicle for a long period in a highly predictable environment with low event occurrence, were in a *trance* [17]. After a phenomenon known as *"sleeping with the eyes open during driving"* was noted in 1929 [Miles, 1929], it began to be considered a mild hypnotic trance, called *road hypnosis* [Wertheim, 1991] or *highway hypnosis* [Williams, 1963] or *driving without attention mode* [Kerr, 1991] or even *white line fever* [Vasudevan et al., 2019]. Over the decades, it has been decided to investigate this matter[18].

Experimental study models of the phenomenon. Investigating in this direction is theoretically possible because EEG signals can be applied to the driver's skull, without disturbing or distracting him or her, to verify whether he or she is in a state of hypnosis during certain phases of the journey, which would then be auto-hypnosis. By using EEG in combination with models normally used in other monotonous contexts, such as XGBoost and the Hidden Markov algorithm [Liu et al., 2021], great strides are being made towards demonstrating spontaneous auto-hypnosis. This is possible by combining driver data (eye movements, EEG data), a mobile phone with AutoNavi Navigation used as an on-board sensor to collect vehicle data (speed, acceleration, etc.), and also using power spectrum density analysis, the sliding window method, and the point-by-point calculation method [Chen et al., 2025]. Experiments in this field have become easier since the existence of advanced driving assistance systems, the environment can be monitored in real time with sensors installed outside the vehicle, the influence of other vehicles nearby can be mastered by perceiving the multi-source information of surrounding vehicles in time, and the various states of the driver can be monitored with sensors inside the vehicle, corresponding measures being taken [Shi et al., 2023].

According to some authors, *road hypnosis* recurs frequently in a typical monotonous scene [Shi et al., 2023]. These researchers used a tunnel or a highway as an example of road simulating vehicle driving experiments, a *road hypnosis* recognition model based on principal component analysis and on a long short-term memory network, extracting various parameters via eye tracking, The accuracy was >97. This experimental paper has provided a novel method to realize the driver's road hypnosis detection. Today it is taken for granted that *road hypnosis*, as a *"state that tends to appear in a monotonous or familiar environment and is prone to occur, strengthen, maintain, transfer, and disappear frequently within a period"*, is different from driving fatigue and driving distraction [Shi et al., 2023].

Terminological and epistemological issues. There is some confusion in the literature regarding the definition of *road hypnosis* when discussing auto-hypnosis. Authors believe that when drivers is in a state of *road hypnosis*, they often do not subjectively perceive that they are in a state of *road hypnosis* (this is probably true), because they are in an

17 in our personal experience, it is mostly truck drivers, who for work drive for many hours at a time, who claim to be unaware of long stretches of their journey or to travel as if they were in a black tunnel... except to react immediately when necessary, things which certainly recall hypnosis

18 although for a long time research has not been able to accurately and effectively identify the hypnotic state by the road [Shi et al., 2023]

unconscious driving state [Shi et al., 2023]. This latter statement would not be consistent with the definition of hypnosis. In fact, hypnosis is a physiological modification of consciousness, and the subject in hypnosis, as well as in auto-hypnosis, is conscious, not unconscious [Casiglia, 2025]. This is a very important point because, on the one hand, it is stated that road hypnosis is possible and frequent, on the other, that this road hypnosis involves unconsciousness, but this would be incompatible with allowing driving. It is true that the driver may not remember what happened to him under road hypnosis, but this is consistent with a *merely dissociative phenomenon* [Casiglia, 2015, 2025] as happens very frequently in any daily activity, not because he has experienced a *"stupor state"* [Shi et al., 2023]. Stupor is a decrease in sensorium (Table 2), and in hypnosis the sensorium is not reduced, but rather unchanged or even enhanced [Casiglia, 2025]. If *road hypnosis* is defined as *"an involuntary driving pattern"* [Cerezuela et al., 2004], then it is not hypnosis because there is nothing involuntary in hypnosis, as highlighted by fMRI, which demonstrates that precisely the areas connected with consciousness and will are activated in hypnosis [Casiglia et al., 2018a].

The need for epistemological clarity on the concept of hypnosis emerges when considering other studies related to hypnosis that occurs spontaneously while driving. In some studies, the phenomenon is defined as *"a state of driving without awareness mode"* [Kerr, 1991] and the trance state during driving is defined as a consequence of a feeling of tiredness following which the driver cannot notice the surrounding traffic [Wang, et al., 2024]. Experimental studies, however, demonstrate that the subject, to enter a trance, must be fully aware, otherwise hypnosis does not occur [Casiglia, 2025; Casiglia et al., 2018a].

More in line with current research, however, appears the opinion that *"compared with driving distraction, road hypnosis is similar to cognitive distraction, in which the driver's attention is not focused on the primary task of driving"*: focusing actually happens in hypnosis, not in distraction or fatigue (Wu et al., 2023).

Many studies based on observations from the 1920s [Miles, 1929] and 1960-1970s [Williams, 1963; Williams & Shor, 1970] describe an *"amnesiac, trancelike state with a longer reaction time*". Experimental studies, however, demonstrate that reaction times do not lengthen in hypnosis unless specific commands are given to that effect; in fact, they can be greatly reduced under certain conditions [Facco et al., 2014; Casiglia et al., 2010; Priftis et al., 2011; Giordano et al., 2012].

The results of these studies, which attempted to demonstrate *road hypnosis* or similar phenomena involving auto-hypnosis using a reaction time detection device in a monotonous highway scene and asking drivers to perform continuous and repetitive tracking or monitoring tasks [Shor & Thackray, 1970], seem more consistent with a phenomenon of drowsiness and fatigue.

Some have also proposed that auto-hypnosis while driving may be elicited not by monotony but by eye movements [Wertheim, 1978, 1991]. The hypothesis was tested with a driving simulation system in a laboratory environment, ensuring that the driving environment generated by the simulation software was similar to that of the actual highway, a two-way, four-lane highway scenario [Shi et al., 2023]. De Jongh's studies, however, would explain this phenomenon through mechanisms related to EMDR [De Jongh, 2024], not to hypnosis. It would have been interesting to record EEG data during the experiment to verify

whether the brain areas involved during the hypnotic trance were activated, but unfortunately only ECG data was recorded. In the same context, a vehicle driving experiment was also conducted on a highway section (36 km at a speed of 80 km/h, not exactly a hypnotic-inducing experience).

Eye movements and facial expressions. Other authors have followed different experimental paths. The eye movement theory [Wertheim, 1978] suggested that *"objects within the driver's visual field move in a predictable pattern relative to the driver, who must maintain prolonged focus on these objects, thereby easily inducing a phenomenon similar to hypnosis"*, which has given rise to a line of research. According to some, "drivers tend to feel sleepy or drowsy even though they remain seated in a normal position, with hands on the steering wheel and looking forward" [Brown, 1991] with an expressionless gaze described as *"a glassy stare"* [Williams, 1963]. These signals do not seem to correlate with what happens in induced hypnosis. There are also many other descriptions that include *"an apparent loss of consciousness… in such a way that driving becomes automatic"* [Kerr, 1991]. In this case, a contrast emerges with what occurs in hetero-induced hypnosis, in which no loss of consciousness or automatisms are detected. There is apparently a reduced arousal**19** level resulting in waning alertness, which, although it can effectively *"increase the probability of risky driving"* [Wertheim, 1978, 1991], is not typical of hypnosis, which modifies consciousness but does not reduce the sensorium nor the arousal when this is present (Table 2) [Casiglia, 2015, 2025]. Briest also found in some drivers *"a deep unconscious driving state in monotonous environments like highways"*, a condition (even defined by the author as *"an obvious state of unconsciousness"*) [Briest et al., 2006] which cannot be hypnosis since, as already specified, hypnosis does not occur if the subject is not conscious [Casiglia, 2015, 2018a, 2025; Casiglia & Gadotti, 2022].

EEG while driving. It has recently been understood that the best way to demonstrate that a subject is in hypnosis, that is, that they have overcome the trigger of *plastic monoideism*, is fMRI [Casiglia et al., 2019, 2020]. However, since it is not possible to drive inside a tube, the only viable way to demonstrate road or highway hypnosis (and therefore confirm the existence of auto-hypnosis while driving) is to apply an EEG to the driver. EEG allows (not optimally but acceptably) to separate the state of hypnosis from normal consciousness, the pattern most indicative of hypnosis being represented by frontal and central θ dominance, prefrontal ß collapse[20], and parieto-occipital α suppression[21] followed by stabilization.

A methodological study on 45 drivers aged 26 to 60 years driving on the road demonstrated the feasibility of an investigation, however, using only eight electrodes placed in the frontal and superior areas [Wang, 2024].

19 *arousal* is a term used in practice only by psychologists (Table 2)

20 related to executive control

21 due to focusing effort (hypnosis is a focused condition)

Some authors[22] have used EEG while driving, demonstrating, however, the existence of fatigue with drowsiness[23] rather than auto-hypnosis.

With EEG electrodes during driving, Chen et al. [2025] demonstrated using the XGBoost-HMM-based what the authors called *"the road hypnosis state of drivers"* (erroneously considered unconscious) and proposed *"a new road hypnosis identification method is proposed"*, without managing to unequivocally capture that auto-hypnosis occurs while driving[24].

Auto-hypnosis while driving appears to have been demonstrated by Cerenzuela et al. [2004] in 14 experienced drivers aged 29.6 years (range 24 to 54) contacted by the University Institute for Traffic and Road Safety of the University of Valencia, randomly selected in a 4×2 mixed factorial design driving 90 km in a continuous uninterrupted way for about 45 minutes on a motorway or on a conventional road, keeping a constant speed between 100 and 120 km/h, staying on the right lane, and remaining silent. In this study, a video camera focused on the driver's face in order to record eye movements was used, an electrophysiological recording equipment with silver chloride electrodes recorded EEG activity through α, ß and θ waves (Table 3). The analysis of variance showed a significant overall effect for the interaction between driving time period × road type, with significantly higher values for conventional *road driving* indicating a higher alertness level on motorways than on conventional roads [Cerenzuela et al., 2004]. These results, despite the impossibility of finding significant differences between motorway and conventional driving conditions in the measurement of occipital–parietal α activity, are indeed compatible with the existence of *highway auto-hypnosis*, not however with reduced alertness but rather increased as one would expect in hypnosis [Casiglia, 2025].

WHY DOES AUTO-HYPNOSIS OCCUR? A RECEPTOR EXPLANATION OF THE PHENOMENON

The questions that can legitimately be asked about the motives and mechanisms underlying auto-hypnosis are the same as those related to induced hypnosis. From an anthropological perspective, the underlying reason is that the natural tendency toward auto-hypnosis is evidently favorable to the *Homo sapiens* species and has therefore been maintained from the very beginning to the present day [Casiglia, 2008, 2012, 2020; Casiglia & Gadotti, 2026b]. If, however, one asks how auto-hypnosis occurs, the authors propose that hypnosis is always a receptor-induced phenomenon [Casiglia, 2008, 2012, 2020, 2024].

The fundamental question is: are the psychic and physical effects of hypnosis and auto-hypnosis receptor-induced, or do they simply appear to be receptor-induced? In other

22 Papadelis et al. [2026] through an increase in α waves and a decrease in θ waves, Wang et al. [2024] through the fluctuation dispersion entropy of the rhythms of θ and ß waves (Table 3), Tran Y. et al. [2008] through entropy analysis and second-order difference plot analysis, Kar S. et al. [2010] and Rodríguez-Sotelo et al. [2014] again through entropy methods, Mu et al. [2017] using fuzzy entropy for feature extraction from the frontal lobe, and Min et al. [2017] through entropy fusion analysis

23 drowsiness is characterized by θ waves, sleep by k-complexes and spindles in N2 phase, all characteristics not compatible with hypnosis (it is not possible to dwell on this topic here)

24 furthermore, the analysis of eye movements appears superfluous to a hypnotist since the electroencephalographic pattern of hypnosis during a task, especially if analysed with a modern electroencephalographic system such as LORETA, is well known [Casiglia et al., 2012]

words, is hypnosis/auto-hypnosis a great mimic that – in some way, however, unknown to science – can simulate many effects *as if* they were real, or are they real and hypnosis actually produces them by acting (presumably indirectly) on receptors that, thanks to pharmacology, are well known to us? In the first case *(as if)*, we would be faced with something unusual, unproven, and entirely new that deserves to be investigated with methods and technologies that, however, do not exist. In the second case (receptor effect), it must be recognized that hypnosis/auto-hypnosis can, from time to time, activate systems capable of releasing agonists or antagonists that interact with this or that receptor. This second hypothesis is, moreover, already accepted by so-called *psycho-neuro-endocrine-pharmacology*, which recognizes that mental/cognitive experiences of cortical origin have the capacity to release humoral mediators with receptor effects; extending this hypothesis to hypnosis seems entirely consequential. Moreover, pharmacology teaches that any physiological effect derives from the activation of some receptor or receptor system [Casiglia, 2024].

Receptors are typically glycoproteins or ion channels. Effector molecules, now called *ligands*, interact with them through weak, usually reversible chemical bonds. The ligand-receptor bond (a process called docking) physically modifies the receptor's structure, resulting in a different but predictable functional state.

Many of the chemical ligands whose effects can also be produced under hypnosis are of plant or bacterial origin (think digitalis glycosides, salicylates, muscimol, salvinorin, ibogaine, cocaine, caffeine, morphine, ergotamine, botulinum toxin, etc.) and have been used for centuries or millennia as poisons or remedies, even though they are now industrially produced and are therefore called *drugs*. This may explain why the principles of the receptor action of hypnosis have been so firmly, albeit unconsciously, acquired in the imagination of the species *Homo sapi*ens. Ligands that are already present in the organism without the need for external introduction (usually hormones, amines, etc.) are often called mediators or transmitters (neurotransmitters in the case of those originating from or acting on the nervous system). Mediator+receptor complexes that respond to ligands already present in the organism are called endogenous systems. Many molecules are capable of activating endogenous systems, producing psychic and physical effects. The same applies to many mental/emotional situations, such as fear (which activates the sympathetic adrenergic/noradrenergic system or, conversely, the parasympathetic cholinergic system), pain (which activates the opioid system), stress (which activates, among other things, the adrenocortical pathways), the placebo effect (which activates different systems depending on the context), etc.: mental situations release mediators (adrenaline, noradrenaline, corticosteroids, endorphins, endocrine disruptors, etc.) which in turn act on their own receptors, generating an effect. This mechanism, however, is somewhat complex, and its overall effects are difficult to predict in individual cases (for example, fear can stimulate but also paralyze; stress can be beneficial in certain contexts and harmful in others).

In the case of the effects of hypnosis/auto-hypnosis, the ligands are replaced by mental images made plastic in the hypnotic trance within the framework of plastic monoideism: the images release mediators and transmitters that produce the effect.

The receptor-mediated effect of hypnosis appears to be confirmed by numerous experimental studies [Casiglia et al., 1994, 1997, 2006, 2007, 2010, 2012, 2015, 2016, 2018, 2018a, 2019, 2020; Casiglia & Giacomello, 2011; Casiglia & Mentesana, 2018; Facco et al.,

2011, 2013, 2014, 2017, 2018; Giodano et al., 2012; Priftis et al., 2011; Tikhonoff et al., 2012, 2018].

This explanation, involving specific receptors and endogenous mediators, could also be an explanation for auto-hypnosis, where only mental images exist. These are sufficient to elicit the hypnotic trance by activating the trigger mechanism of plastic monoideism [Casiglia, 2024].

CONSIDERATIONS ON INDIVIDUAL RESPONSIBILITY

Since the underlying mechanisms are the same, auto-hypnosis, like other-induced hypnosis, does not alter the subject's individual responsibility. This, according to the authors of this paper, is significant in two ways.

In general, anyone who performs or accepts an action claiming to have done so because they were, or felt they were, under auto-hypnosis must be considered capable of understanding and willing because they acted consciously and voluntarily [Casiglia et al., 2020]: the plastic monoideism [Casiglia et al., 2019] that triggers and effectively constitutes the state of hypnosis [Casiglia & Gadotti, 2022] does not put the subject in a position to want or accept things different from those they would have wanted or accepted under conditions of normal consciousness. By analogy with the more studied hetero-hypnosis, it must be assumed that auto-hypnosis cannot occur without what we call consent: the *veto area* (dFMC), believed to be responsible for the hypothetical free will of saying no [Brass et al., 2019; Kuhn et al., 2009], should not be affected (however, experimental studies on the subject are completely lacking).

On the other hand, in the specific case of driving, being in auto-hypnosis does not impair driving ability and should not be considered a cause for concern or temporary incapacity. In almost all cases, experiments conducted to demonstrate auto-hypnosis on the road have instead highlighted a condition of fatigue facilitated by monotony. It is fatigue that the driver should be concerned about. Even in the case of proven auto-hypnosis, this, similarly to other-induced hypnosis, would not lead to reduced performance (which in fact we have always found to be increased in our experiments) [Casiglia & Tikhonoff, 2015; Tikhonoff et al., 2012] nor to a lengthening of reaction times (which we have always found to be shortened during any task in hypnosis) [Casiglia et al., 2010; Facco et al., 2014; Tikhonoff et al., 2012]. The only concern, however never even touched upon experimentally, is the theoretical one of a hypothetical *lateral neglect* that could make the driver indifferent to one side of the world; this eventuality has been demonstrated by specific studies that have induced operator-induced lateral neglect in hetero-hypnosis in the context of scientific studies [Priftis et al. 2011] but it is completely unknown whether this can occur spontaneously in auto-hypnosis through self-generative activation by the Unconscious.

CONCLUSION

This paper attempts to delineate the epistemological status of spontaneous auto-hypnosis by placing it within the framework of experimental neurophysiology and evolutionary biology. The analysis highlights a profound discrepancy between the phenomenon's pervasiveness in everyday life and the paucity of validated experimental data. From an

anthropological and phylogenetic perspective, the natural tendency to *trance* emerges as a fundamental adaptive resource for the survival of *Homo sapiens*, rooted in the functioning of the ancient *bicameral mind* prior to the recent structuring of the Ego. Experimentally, attempts to isolate the phenomenon in ecological contexts – such as so-called *road hypnosis* – have struggled to separate auto-hypnosis (spontaneous trance) from drowsiness. Neurophysiological evidence and the rare validated EEG models (such as the study by Cerenzuela et al., characterized by frontal θ dominance) demonstrate that auto-hypnosis is a physiological modification that maintains, and sometimes enhances, alert attention, supported by the active activation of cortical areas connected to volition. Traumatic memory loss or traumatic analgesia does not result from sensory *stupor*, but from dynamics of protective mental dissociation. The ultimate and fundamental explanation of the phenomenon lies in its intrinsically receptor-dependent nature, a coherent extension of the principles of psycho-neuro-endocrine-pharmacology. Auto-hypnosis does not act as a mere phenomenological simulator, but produces real and measurable physical and psychological changes, comparable to the effects observed in pharmacology after the administration of receptor agonists or antagonists. In the context of spontaneous *trance*, activation of the trigger mechanism of plastic monoideism transforms mental images into functional substitutes for chemical ligands. These cortical images stimulate the targeted release of humoral mediators and endogenous neurotransmitters capable of inducing specific receptor docking on ion channels and glycoproteins, replicating traditional pharmacodynamics. In conclusion, it can reasonably be argued that auto-hypnosis constitutes a physiological modification of consciousness. Definitively validating this model requires rigorous multidisciplinary protocols that integrate hypnotic expertise with neurophysiological and pharmacological analysis.

Table 1: Acronyms used in the paper.

Acronyms	Meaning
dFMC	corteccia frontomediale dorsale
ECG	electrocardogram, elecrocardiographic
EEG	electroencephalogram, electroencephalographic
EMDR	eye movement desensitization and reprocessing
fMRI	functional magnetic resonance imaging
LORETA	low resolution brain electromagnetic tomography
REM	rapid eye movements

Table 2: Sensorium, consciousness and arousal [Casiglia, 2020, 2025].

Functions	Description
sensoriun	the ability to perceive and integrate events through the use of attention and memory; it arises from the coordinated activity of diverse and varied nervous functions. Typical of animals and relevant to humans as animals
consciousness	the ability to respond to external stimuli while having a qualitative internal experience of existence. It is acquired over time through culture
arousal	a temporary state of heightened alertness and alertness evoked by a prompt reaction to a stimulus; a concept of exclusive interest to psychologists; in animals, it pertains only to the sensorium; in humans, it pertains to both the sensorium and consciousness, thus also taking on cognitive connotations

Table 3: ECG waves and their meaning.

Sensorium	Waves	Frequency (Hz)	Related to
⇩	β	23-30	active wakefulness (but also stress, anxiety, arousal)
	γ	30-42	higher cognitive functions (learning, insight, arousal)
	α	8-13	closed-eye waking relaxation
	θ	4-8	drowsiness, light sleep (even in REM phase), imagination, *mind turned inward*
	δ	5-4	deep dreamless sleep (stage N3)

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